

LEO systems will operate below 1 GHz and carry only brief digital messages [see "Data Communications," p. 26]) will ultimately cover the world continuously. Satellite operators will have to obtain government permissions to sell service to each country, typically through local affiliates. Competing with these U.S. systems will be London's International Maritime Satellite Organization. Better known as Inmarsat, it will form a British affiliate company to set up a \$2.6 billion Big LEO system of 10 satellites.

The Spaceway system, from GM

Hughes Electronics in Los Angeles, is to offer all-digital voice, data, and video services directly to U.S. residents, beginning in 1997. Its geostationary 48-beam satellites would feed terminals having ultra-small apertures 660 cm across. Subscribers would receive telecommuting, telemedicine, digital libraries, and other high-bandwidth services at data rates of 16 kb/s to 1.544 Mb/s.

#### Wireless auctions

The FCC announced a new Wireless Telecommunications Bureau. This reflects

the convergence of wireless services from two categories: public, including cellular telephone and paging, and private, including so-called two-way radio services originally intended for organizations' internal use but now addressing the general public as well.

Thanks especially to the progress made by upstart vendors with new technologies and to the inclination of Congress to treat similar wireless applications similarly, the distinctions between these two categories, public and private, diminished in 1994. Now the FCC will determine if

## Viewpoint: An airline-style price war looms in telecommunications

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**T**elecommunications is about to go through the same revolution as the computer industry did, and the speed of its fundamental transformation will likely catch traditional suppliers in the field unawares.

Several years ago in the computer industry—after long hearing about such visions of the future as supercomputers on the desktop—suddenly the future happened. PCs became so powerful that they made the mainframe almost irrelevant.

This revolution caught mainframe makers by surprise, giving those once-proud corporations the opportunity of deciding which divisions to sell off in order to remain solvent. Today, Digital Equipment Corp. is little more than a PC mail-order company, and IBM Corp. tries to squeeze increasing blood from mainframe turnips.

Key to the computer revolution was the PC's personal aspect. A powerful computer became usable by ordinary individuals. In telecommunications, the same thing is about to happen, and for the same reason: powerful personal computers.

What proof? The Internet now reaches more than 30 million people in 159 countries. Unlike individual networks such as CompuServe or America Online, the Internet is a fundamental infrastructure connecting the world's networks. With a growth rate of 15–20 percent a month, the day is coming when every computer in the world will be linked to this mesh.

Such wholesale connectivity is transforming the demand for raw communications capacity. In a typical home, a telephone is used for voice calls for an hour or so. What happens when the computer goes online? The demand goes from 1 hour to 24 hours and from

a single voice channel to (if we could get it) a T1 line operating at 1.544 Gb/s, 23 times faster. That's more than a 400-fold increase.

Telecommunications companies like to fancy themselves as "value-added providers of information." The truth, however, is that to survive in the new world, they must shed notions of providing information and must measure themselves by a single metric: dollars per bit per second. They are no different than electrical, water, sewer, or any other utility competing for the right to push stuff through a pipe.



**'Because of PCs and multimedia services..., the demand for telecommunications capacity is going up by a factor of 400.'**

Historically, large telecommunications companies have distinguished themselves in three ways: by large investments in capacity, by a sophisticated control network, and by customer service. All three of these defining factors are being assaulted by a world of interconnected computers.

The capacity to bring bits to the home or across the country requires a huge fixed investment. Both the long-haul and local telephone carriers have invested in capacity. But cable television companies have also invested in bringing a coax infrastructure into the home. Electrical companies are beginning to use their wires for communication and control as well.

The new reality is simple: there is so much capacity and competition that telecommunications providers are

about to go into an airline-style price war to keep market share. If the phone companies don't lower their prices, then the cable-TV or electrical companies will undercut them to sell bandwidth.

What about the big telephone companies' vaunted control and routing networks? Yes, they have wonderful switching networks—but they are no longer alone. It is in control and routing that the PC revolution has hit really hard. The capability of million-dollar central office switches is now available on the desktop as a router from companies such as Cisco, Proteon, and Wellfleet. Any small business can now be a small phone company.

So what does that leave? Customer service is the only remaining way that a telecommunications company might distinguish itself from some other bits-to-the-home provider. But customer service is just a perk, like a frequent-flyer club: if the service costs more than a competitor's does, people will still go to the one that's cheaper.

Because of PCs and the multimedia services available through the Internet, the demand for telecommunications capacity is going up by a factor of 400. To get that increase in demand (and to avoid bankruptcy), companies in this business have to start thinking strictly in terms of dollars per bit per second. How cheap will it get? How does \$30 a month for a T1 line grab you?

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